TWO UNDESCRIBED GENERA IN THE ORCHIDACEAE-ONCIDIINAE

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Many species of "miniature" orchids grow on small twigs, whether in the upper layers of tall forest or in lower and more accessible cloud forests. Such orchids are easily overlooked, even when flowering, and they are very poorly represented in herbaria. In the present paper we will describe two genera of miniature orchids, one of which, we believe, has been collected only once, while the other is relatively well known, but has been treated as a subgroup of the large and rather ill-defined genus Oncidium.

CYPHOLORON FRIGIDA, gen. et sp. nov.

Pseudobulbis minutissimis, ovoideis, monophyllis; foliis equitantibus, ligulato-ensiformibus; pedunculo filiforme, 2-3-floro; sepalis petalisque similibus, liberis, elliptico-lanceolatis; labello unguiculato, basi cum columna breviter connato, cordato-ovato, apice retuso; columna longa, tenue, basi incrassata, apice bialata, alis porrectis, anthera dorsalis; glandula minuta, ovata; stipes longissimus; polliniis 2, ovoideis.

Dwarf epiphytic caespitose plants to 1.5 cm. tall; with ovoid pseudobulbs ca. 4 mm. long, 2.5 mm. wide, each bearing a single ensiform leaf, 7.5-10 mm. long, 1.5-2 mm. wide, the bases of the pseudobulbs enveloped by the distichously imbricate, conduplicate bases of 4-6 conspicuous, foliaceous bracts, the blades ligulate-ensiform, acute, 7-12 mm. long, 1.5-2.5 mm. wide. Inflorescences 1-4, erect, filiform, 2-3 flowered peduncles produced from the axils of the foliaceous bracts, 1.5-2.5 cm. long; floral bracts ovate when spread, pink, apiculate, 1.5 mm. long. Flowers very large for the size of the plant, 12-14 mm. wide, white with pink lines; the sepals free, spreading, the dorsal sepal elliptic-lanceolate, slightly concave, 7 mm. long, 1.5-2 mm. wide; the lateral sepals obliquely elliptic-lanceolate, concave, acuminate, 7.5 mm. long, 2-2.5 mm. wide, conspicuously 3-nerved, white with pink nerves; petals spreading, linear-oblanceolate, acute, 6.5-7 mm. long, 0.5-1 mm. wide, with a single pink nerve, base pink; lip with an elongate claw at the base, the blade abruptly dilated, 2.5 mm. long, 0.5-0.8 mm. wide, ovate, cordate, the apex emarginate, with a depression running from the apex of the blade to the center and then branching to

form a Y-shaped channel which extends to each side of the claw at the base; column basally adnate to the claw of the lip, slender, somewhat arcuate, ca. 5 mm. long, swollen and with a concavity dorsally at the base (the clinandrium), apex provided with a slender porrect wing on each side, stigma ovate, at the apex of the column; anther dorsal, elongate; pollinarium with simple ovate viscidium and extremely elongate stipe, this 5 mm. long, broader toward the apex; pollinia 2, compressed, ovoid, waxy, borne near the base of the column.

Holotype: ECUADOR: prov. Loja; km. 13, road from Loja to Zamora, 2750 m.; 10 December 1957; epiphytic on the outer twigs of fairly large trees in the fog forest; sepals and petals white with red lines; column white; lip white with red spots, C. H. Dodson 216 (US).

This remarkable little plant is related to the section Macroclinium of Notylia, from which it differs strikingly in the porrect column wings and in the exceedingly elongate anther, with the pollinia borne near the base of the column. The position of the pollinia recalls some genera of the Ornithocephalus complex, but the number and form of the pollinia, as well as the terminal position of the stigma, indicate that there is no close relationship with that group.

While each inflorescence bears only a single flower at a time, each also bears a bract with an axillary bud. This bud later develops a short branch with a second flower and another bud. Thus, several flowers may develop in sequence, just as some species of Notylia develop several flower clusters, one after another.

The generic name, meaning "bent strap," refers to the extremely long stipe, which becomes bent soon after removal from the flower. The specific epithet refers to the ambient temperature at the type locality.

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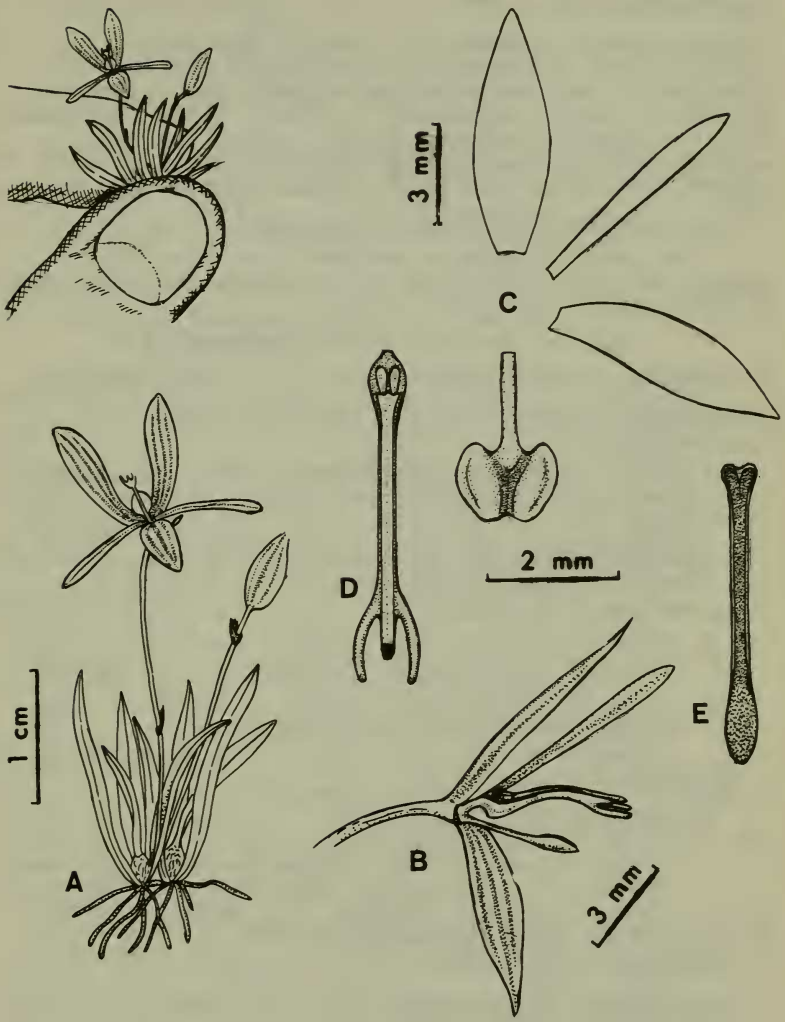
Figure 1. Cypholoron frigida. A. Habit, B. Flower, lateral view with near petal and lateral sepal removed, C. Floral segments, flattened, the lip at the same magnification as D and E, D. Column, dorsal view with anther removed, showing the pollinarium in place, E. Anther, ventral view, Inset from a photograph.


3 mm
C
D
2 mm
E
1 cm
A
B
3 mm

PSYGMORCHIS, gen. nov.

Cauli brevi, monopodiali; foliis numerosis, ensiformibus, equitantibus; pedunculo axillaris, condensato; sepalis petalisque similibus, liberis, patentis; labello profunde 4-lobato, callo carnosulo basilari ornato; columna brevi, recta, bialata; anthera terminalis, triangularis; glandula minuta; stipes tenuis; polliniis 2; stigma 2-incisum.

Type species; Epidendrum pusillum L.

The generic name is derived from the Greek psygma, or fan, referring to the characteristic form of the plant.

Key to the Species of Psygmorchis

1. Margins of callus entire . . . . . P. pusilla
1. Margins of callus deeply crenate, digitate or fimbriate
   2. Lateral lobes of lip quadrangular; lip longer than broad; flowers pure yellow, without brown spots . . . . . P. pumilio
   2. Lateral lobes of lip orbicular; lip as broad as long or broader than long; flowers yellow or spotted with brown
      3. Flowers yellow; lip broader than long, lobes usually overlapping; autogamous . P. gnomus
      3. Flowers spotted; lip about as broad as long, lobes usually not overlapping, not autogamous . . . . . P. glossomystax

1. PSYGMORCHIS PUSILLA (L.) comb. nov.
   Epidendrum pusillum L., Sp. Pl. ed. 2: 1352. 1763 - Cymbidium pusillum (L.) Sw., Nov. Act. Upsal. 6: 74. 1799 - Oncidium pusillum (L.) Reichb. f., Walp. Ann. Bot. Syst. 6: 714. 1863 - Tolumnia pusilla (L.) Hoehne, Iconografia Orch. Bras. 231. 1949.
   Oncidium iridifolium HBK., Nov. Gen. & Sp. 1: 344. 1815.
   Epidendrum ventilabrum Vell., Fl. Flum. Ic. 9: t. 32. 1827.
   Oncidium allemanii Barb. Rodr., Genera et Sp. Orch. Nov. 2: 185. 1882.
   Oncidium pusillum var. megalanthum Schltr., Repert. Sp. Nov. Beih. 27: 115. 1924.

2. PSYGMORCHIS PUMILIO (Reichb. f.) comb. nov.
   Oncidium pumilio Reichb. f., Bot. Zeit. 10: 697. 1852 - Tolumnia pumilio (Reichb. f.) Hoehne, Iconografia Orch. Bras. 231. 1949.

Oncidium titania Schltr., Repert. Sp. Nov. Beih. 19: 67. 1923.
Oncidium oberonia Schltr., Repert. Sp. Nov. Beih. 27: 113. 1924.
Oncidium hondurense Ames, Bot. Mus. Leafl. 1(5): 3. 1933.

3. PSYGMORCHIS GLOSSOMYSTAX (Reichb. f.) comb. nov.
Oncidium glossomystax Reichb. f., Bot. Zeit. 10: 696. 1852.
?Oncidium articulatum E. S. Rand, Lindenia 5: 8. 1889.

4. PSYGMORCHIS GNOMUS (Kränzlin) comb. nov.
Oncidium gnomus Kränzlin, Pflanzenreich IV. 50, Heft 80: 98. 1920.

Psygmorchis is distinguished from all other members of the subtribe by a plethora of characteristics. Surprisingly, until now only Hoehne (1949) has treated this as a distinct genus, using the name Tolumnia Raf., which was based on a quite different plant. Kränzlin, in his unhappy attempt at a monograph of Oncidium (1920), treated this group merely as subsection Iridifolia of section Aphanobulbia, with the very different subsections Variegata and Miltoniastrum. Dodson elevated the group to sectional status (1957), a status with which Garay concurs (1970). In view of the many and basic differences, though, we feel that this small group should be entirely removed from Oncidium.

Habit - Oncidium normally shows a sympodial habit of growth with pseudobulbs and dorsoventrally flattened leaves. In some species of Oncidium the pseudobulbs are reduced, and the leaves may be very fleshy or subterete. In Psygmorchis, on the contrary, the stem growth is indefinite (monopodial), there are no pseudobulbs, and the leaves are laterally flattened and equitant.

Inflorescence - In Psygmorchis the inflorescence is a condensed raceme, arising from the lower leaf axils. Normally each raceme produces only one flower at a time, but a number of flowers may be produced successively over an extended period. Such an inflorescence is unusual in Oncidium, but similar condensed inflorescences do occur, for example, in O. lindenii Brongn. and in O. papilio Lindley and its close allies, all of these being rather aberrant but by no means similar to Psygmorchis.

Flower Structure - In over-all structure the flower of Psygmorchis is similar to that of Oncidium; the sepals and petals are small and

spreading, while the lip is much larger and deeply lobed, diverges sharply from the base of the column and possesses a fleshy callus near the base. The column has a "tabula infrastigmatica," like most members of Oncidium, and has two broad, membranous, spreading wings. The rostellum divides the stigma into two notches apically, giving a form much like that of Cycnoches, and doubtless functioning in the same way, the notches serving to catch and hold the pollinia. The anther is distinctly triangular, a feature we have not seen in any Oncidium. The pollinarium, a feature of special importance in this subtribe (Williams 1970), is quite distinctive. The stipe is long and narrow, widest near the middle or subapically and folded over; the pollinia are laterally attached near the apex of the stipe.

Crossing - There have been a number of attempts to cross "Oncidium" pusillum with Oncidium species of various groups (Sanford 1964). As far as we know, the only successful cross has been with Oncidium X Java (O. flexuosum X O. varicosum). Kugust (1966) reported a high percentage of cripples in this cross, but did not mention the fertility of the hybrids. While this hybrid gives positive evidence of a relationship between Psygmorchis and Oncidium, the difficulty of crossing Psygmorchis and Oncidium, and the high percentage of cripples in the only known F_1 suggest that these plants are not congeneric.

Chromosome Number - The diploid chromosome number of Psygmorchis pusilla was found to be 10 (Dodson 1957), based on plants from Panama. This number was confirmed by Sinotô (1962), with material cultivated in Hawaii. More recently Withner and Ames (cited by Kugust 1966) found a diploid number of 14 in plants from Peru, and found the same number in P. glossomystax. These are much the lowest chromosome numbers known in the group. The known chromosome numbers of Oncidium range from 2n = 26 in Oncidium nanum up to 112 and 168 in O. varicosum. A slightly lower number is found in Trichocentrum (with 24 and 28), which appears to be very closely allied to Oncidium section Miltoniastrum, the section with the lowest chromosome numbers.

Both Garay (1963) and Sanford (1965) have suggested that seven may be the basic chromosome number for the Oncidiinae. This is, however, a very low number for the Orchidaceae, and we suspect that both seven and five represent reductions from a higher basic number. Stebbins (1958) has discussed the tendency for reduction in chromosome number (with resultant increase in linkage) in plants with

a short life cycle. While these orchids are not strictly annual,* Allen (1953) has shown that they do have an unusually short life cycle. We believe that Psygmorchis represents another case of reduction in chromosome number associated with a short life cycle.

Psygmorchis pusilla is commonly found in coffee or citrus trees and on various vines in secondary forest. In undisturbed regions it is often found on Pithecellobium trees overhanging rivers. Psygmorchis pumilio, P. glossomystax and P. gnomus are almost exclusively found in guava trees (Psidium guajava). Dodson has suggested that P. glossomystax and P. gnomus may have arisen as hybrids between P. pusilla and P. pumilio (unpublished doctoral thesis, see also van der Pijl and Dodson, pp. 167-168).

A Comparison of Psygmorchis and Lockhartia

Garay (1963) has suggested that Lockhartia should be united with the section Iridifolia of Oncidium and that these species are the most primitive members of the tribe and of the genus Oncidium. In their morphology we can find no feature which suggests a primitive status for either group, and we consider both to be highly derived. While Psygmorchis and Lockhartia both have laterally flattened leaves without an abscission layer and both have low chromosome numbers, there are rather fundamental differences overlooked by Garay. Though the stems of Lockhartia are much longer than those of Psygmorchis, the growth of Lockhartia is distinctly sympodial. The inflorescence of Lockhartia is either upper axillary or terminal. Terminal inflorescences are not known to occur in Psygmorchis, Oncidium or any other member of the Oncidiinae. The nature of the inflorescence is even more strikingly different. The inflorescence of Lockhartia is determinate (or cymose). We know of no other orchid which has a cymose inflorescence, though this condition is approached in the reduced inflorescence of Cypholoron. Superficially, some species of Lockhartia have flowers much like those of Oncidium or Psygmorchis, but the details of the callus and column are always different. The very short column of Lockhartia lacks a "tabula infrastigmatica," and

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*We cannot settle the acrimonious debate over whether or not there are annual orchids. As to the possibility of a given species (or even clone) being either annual or perennial under different ecological conditions, we may mention Gossypium barbadense L., Lycopersicon esculentum Mill. and Ricinus communis L.

the stigma is deep and relatively narrow. The structure of the pollinarium is fundamentally very different in Lockhartia. The stipe is short and broad, of about the same size as the upper surface of the viscidium. After removal from the flower the stipe is soon appressed to the viscidium and is then very difficult to distinguish. Each pollinium is attached to a cylindrical, hyaline caudicle which is much longer than the stipe. These two caudicles may be distinct for most of their length or nearly completely joined. Such a pollinarium is quite unlike anything known in the Oncidiinae, but is quite similar to the pollinarium of Centropetalum (Pachyphyllinae).

In view of the very considerable morphological differences between Lockhartia and Psygmorchis, the similar chromosome number seems less significant. As far as we know, all attempts to cross Lockhartia with Psygmorchis or with other members of the Oncidiinae have been unsuccessful. We believe that the subtribe Lockhartiinae of Schlechter should be maintained for this genus, and that it is probably most closely allied to the Pachyphyllinae.

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